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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/682,492	10/10/2003	Ji-Young Kim	259/019	1457

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EXAMINER

WILSON, ALLAN R

ART UNIT PAPER NUMBER

2815

DATE MAILED: 09/30/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Supplemental Office Action Summary

Application No.

10/682,492

Applicant(s)

KIM ET AL.

Examiner

Allan R. Wilson

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 and 3-13 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1 and 3-13 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|--|
| 1) ☐ Notice of References Cited (PTO-892) | 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____ |
| 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) ☐ Notice of Informal Patent Application (PTO-152) |
| 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____ | 6) ☐ Other: ____ |

DETAILED ACTION

A phone conversation with Eugene Lee's office on 9/26/2005 resulted in the following Supplemental Action to add claim 8.

Drawings

The drawings are objected to because reference sign 130a points to a line, not an intersection as described in the specification in paragraph 38.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

Claim 8 is objected to because of the following informalities: The phrase "an interlayer dielectric layer formed over the sidewall spacer formed on the sidewall of one of the plurality of pass gates and field region of the substrate" is confusing. It is confusing whether the dielectric or the sidewall is formed on the field region. Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 3-5, 8-10 and 13 are rejected under 35 U.S.C. 102(b) as being anticipated by 6,300,655 to Ema et al. (of record). Ema et al. teach in figure 11 a memory cell of a semiconductor device (col. 3, lines 17-19) comprising:

a substrate (col. 14, line 31) having active regions (AR1, AR2...) and field regions (FOX, (col. 14, lines 32-35);

a gate layer formed over the substrate, the gate layer including a plurality of access gates formed over the active regions of the substrate (e.g. W2 and W3 formed over active region AR2) and a plurality of pass gates formed over the field regions of the substrate (e.g. W1 and W4 formed over the FOX region);

first self-aligned contact regions (BC SAC region) formed between adjacent pass gates and access gates (e.g. the region between W1 and W2 or between W3 and W4); and

second self-aligned contact regions (DC SAC region) formed between adjacent access gates (W2 and W3),

wherein a width of each of the first self-aligned contact regions is larger than a width of the second self-aligned contact regions (Ema et al. teach that the pass gates W1 and W4

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are formed having notches such that the distance between W1 and W2 is greater than the distance between W2 and W3, see fig. 11), and

wherein the width of the first self-aligned contact region is made larger than that of the second region by the reduced width of the adjacent pass gate (by means of the notch).

Regarding claims 3 and 4, Ema et al. teach in 13, lines 56-65 that the width between word lines without a notch (the width of the second contact region) is 130nm while the width between word lines where there is a notch (the width of the first contact region) is 150nm which equates to a ratio of 1.15 which is approximately 1.1. Regarding claim 5, Ema et al. teach in figure 1I that sidewall spacers 20 are formed on the sidewalls of the pass and access gates. Regarding claim 8, Ema illustrates in figures 1H and 1I an interlayer dielectric layer 22 formed over the sidewall spacer 20 formed on the sidewall of one of the plurality of pass gates 14 and field region of the substrate ("over the whole surface of the substrate," col. 6, lines 30-32). Regarding claims 9 and 10, Ema et al. teaches that the widths of access gates W2 and W3 are decreased by a notch formed on at least one side and that the depth of the notch is 20nm (col. 13, lines 56-65). Regarding claim 13, Ema et al. disclose that the access gates together have a pair of notches and that the notches are formed on opposing sides of the access gates (see fig. 11).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 6 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ema et al. as applied above in view of 6,362,506 to Miyai. Ema et al. taught the device of claim 5 but did not teach that the gate was formed in a recess hole in the substrate. Miyai teaches in figure 13 a DRAM device having a gate 138 formed in a recess in a substrate 102, the gate being tapered and thus having a larger diameter above the opening as compared to within the opening. Moreover, it is considered well known in the art to provide a taper within the opening. Regarding claim 7, Miyai also teaches that insulation 146 on the sidewall of the gate continues into the trench and below an upper surface of the substrate.

Ema et al. and Miyai are combinable because they are from the same field of endeavor. At the time of the invention it would have been obvious to a person of ordinary skill in the art to form the access gates of Ema et al. having a taper and within the substrate as taught by Miyai. The motivation for doing so, as is taught by Miyai, is that use of such structure permits minimization of the DRAM cell size (col. 3, lines 14-16). Therefore, it would have been obvious to combine Ema et al. and Miyai to obtain the invention of claims 6 and 7.

Claims 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ema et al. Ema taught the device of claim 9 but did not expressly disclose that the notches formed in the access gates are formed adjacent to the first self-aligned contact and either face the other access gate or the pass gate. However, this is considered merely a rearrangement of what is taught by Ema et al. and is not enough to support patentability. *In re Kuhle*, 526 F. 2d 553, 188 USPQ 7 (CCPA 1975).

Response to Arguments

Applicant's arguments filed August 9, 2005 have been fully considered but they are not persuasive.

The argument that “the Examiner misapprehended the subject matter recited in the claim by confusing the access gates with the pass gates. The access gates overlies the active regions” is not persuasive. The confusion comes from the specification and drawings. In FIG. 2 the reference sign 130a points to a line, not an intersection. The reference sign 130b points to a line and an intersection. The Examiner is unsure if the gates are intersections or lines. The examiner suggests the new FIG. 2 should show the reference 100b (as was shown for the field area in the old FIG. 2).

The argument that “the access gates have a smaller width than adjacent pass gates” is not persuasive. The claim states the access gates are formed over active regions and pass gates are formed over the field regions. Ema et al. illustrates in FIG. 11 access gates W2 and W3 over active region AR2 and pass gates W1 and W2 formed over the field regions FOX. At the location of AR1 and AR3 the access gates W2 and W3 have a smaller width than adjacent pass gates W1 and W2. The claim does not disclose whether the gates are intersections or lines.

Ema et al. and the present Application disclose the same inventive concept of making a contact larger with a notch in a gate. Applicants need to precisely claim the structure to overcome the prior art.

The argument that “the Ema et al. reference fails to disclose each of the plurality of access gates having a pair of notches” is not persuasive. Ema et al. illustrates in FIG. 11 the plurality of access gates W2 and W3 has a pair of notches (a notch on each). Applicant may

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want the claim to state --each access gate has a pair of notches--. Note: This is only correct if the access gate is a line.

Claims 1 and 3-13 stand rejected for the above reasons.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a).

Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from an examiner should be directed to Primary Examiner Allan Wilson whose telephone number is (571) 272-1738. Examiner Wilson can normally be reached 7:00-4:00 Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (571) 272-1664. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read "A. Wilson", with a long horizontal flourish extending to the right.

Allan R. Wilson
Primary Examiner
29 September 2005